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Curvilinear Relationships between the Job Demands-Resources (JD-R) Model, and Work Engagement: A Police Service Case Study

Sukanlaya Sawang (s.sawang@griffith.edu.au)
Paula A. Brough (p.brough@griffith.edu.au)
Jennifer P. Barbour (j.barbour@griffith.edu.au)
Social & Organisational Psychology Research Unit
Griffith University, Brisbane QLD 4122 Australia

Abstract

The current study aims to investigate the non-linear relationship between the JD-R model and work engagement. Previous research has identified linear relationships between these constructs; however there are strong theoretical arguments for testing curvilinear relationships (e.g., Warr, 1987). Data were collected via a self-report online survey from officers of one Australian police service (N = 2,626). Results demonstrated a curvilinear relationship between job demands and job resources and engagement. Gender (as a control variable) was also found to be a significant predictor of work engagement. The results indicated that male police officers experienced significantly higher job demands and colleague support than female officers. However, female police officers reported significantly higher levels of work engagement than male officers. This study emphasises the need to test curvilinear relationships, as well as simple linear associations, when measuring psychological health.

Introduction

The recent focus of modern management considers how to engage human capital to produce more output with less input (e.g., Bakker, Schaufeli, Leiter, & Taris, 2008). Consequently, organisational consultancy firms have begun to offer tools for measuring work engagement and programs to enhance engagement among employees. Academic interest of work engagement has also recently increased with, for example, 20 empirical investigations of work engagement recently published in 2008 (listed in the PsychInfo and PsychArticles databases). However the specific exploration of work engagement in high stress occupations such as police services is scarce. The aim of the present study therefore was to assess the antecedents of work engagement commonly experienced by police officers. We employed the recently identified job demands-resources (JD-R) model (Bakker & Demerouti, 2007) as a framework to examine the potential antecedents of work engagement in the police force.

Work Engagement Conceptualisation

Work engagement is an indicator of intrinsic motivation at work and refers to a positive and fulfilling state of mind (Schaufeli, Bakker, & Salanova, 2006). Three dimensions of work engagement are commonly accepted: absorption, vigor and dedication. Absorption is characterised by being fully immersed and happily involved in one's work. Vigor is characterised by a high level of energy and mental resilience while working. Dedication is characterised by a sense of significance, enthusiasm, inspiration, pride and challenge at work. This tripartite definition of work engagement has generally received research support although some authors have suggested that absorption be considered as a consequence of work engagement rather than a structural component per se (Salanova, Llorens, Cifre, Martinez, & Schaufeli, 2003). Recently however, Schaufeli (2006) in a comparison of data from 10 countries (including Australia), demonstrated that the three engagement factors of vigor, dedication and absorption did indeed best define the engagement construct.

Antecedents of Work Engagement

The Job Demands-Resources (JD-R) model (Bakker & Demerouti, 2007; Demerouti et al., 2001) has become a popular framework for assessing both positive and negative characteristics of the work environment (Brough et al., in press). Job demands are defined as the physical, psychological, social or organisational features of a job that require an employees' physical and/or psychological effort. Job demands are strongly associated with psychological strain, health and well-being outcomes. Job resources are defined as the physical, psychological, social or organisational aspects of the job that potentially *reduce* job demands and *enhance* work goal achievement performance. Recent research has demonstrated positive associations between job resources and work engagement via training, job autonomy and technology (e.g. Salanova, Agut, & Peiro, 2005; Schaufeli & Bakker, 2004). Mauno, Kinnunen, and Ruokalainen (2007) for example, assessed levels of work engagement experienced by Finnish healthcare workers. Mauno et al. reported that one of the best predictors over time of work engagement was job control. Similarly, Llorens et al. (2007) demonstrated that self-efficacy significantly meditated the relationships between job control (specifically timing control and method control) and

work engagement, while Hakanen, Schaufeli, and Ahol (2008) found job resources increased subsequent levels of work engagement experienced by Finnish dentists. Bakker (2005) concluded that social support at work, supervisory coaching, job autonomy and performance feedback were common antecedents of work engagement.

The specific association between job demands and work engagement however is not yet clear. A number of studies have concluded that job demands have *no* effect on work engagement, but have a significant positive influence on psychological well-being, including for example, exhaustion (Bakker et al., 2008), absenteeism (Bakker, Demerouti, & Schaufeli, 2003), burnout (Demerouti et al., 2001), and depression (Hakanen et al., 2008). Other research reports that job demands *do* positively influenced work engagement. Mauno et al., (2007) for example, in a study of public health care workers demonstrated that time demands were *positively* associated with absorption and dedication. If replicable, this finding offers support for the growth hypothesis of job demands described within Karasek's Job Demands-Control model (where high levels of both job demands and job control produce employee motivation and fulfillment [i.e., engagement] with work).

Curvilinear Relationships between Job Demands-Resources and Engagement

Curvilinear relationships between employee perceptions of work environment and work-related well-being have been proposed within Warr's Vitamin model (1990, 1994). Warr explained how work characteristics could influence individual well-being by applying the analogy of the human body's response to vitamins. Poor physical health results from insufficient vitamin intake, but when vitamin intake increases, physical health improves. However, if vitamin intake is excessive, physical health will no longer improve and may even decline. This analogy can be applied to job demands-resources and engagement. With low job demands, employees would not be engaged at work. This assumption corresponds with Karasek's (1979) passive and low strain jobs. With an increase in job demands, employees will adjust their orientation to their job and become more engaged at work. However, when there is excessive job demands, employees may feel fatigued or exhausted, and may not engage themselves at work. Similarly, with insufficient job resources, employees do not have appropriate support or control in their work, and hence are likely to become disengaged from their job. However, unnecessary resources can also make employees feel overwhelmed and disengaged from their work.

As proposed by Warr's Vitamin model it is therefore possible that curvilinear relationships exist between job demands-resources and engagement. Thus, the present study aimed to examine both linear and curvilinear relationships between job demands-resources and work engagement.

Research Hypotheses

Hypothesis 1: Job demands will be positively associated with absorption and dedication.
Hypothesis 2: Job demands will be negatively associated with vigor.
Hypothesis 3: Job resources will be positively associated with all three dimensions of engagement.
Hypothesis 4: Job resources will moderate the relationship between job demands and all three dimensions of engagement.
Hypothesis 5: Statistically significant curvilinear relationships will be produced between job demands-resources and all three dimensions of engagement.

Method

Participants and Procedures

We invited 8,283 police officers in one Australian state police service to participate in an online questionnaire assessing their perceptions of job characteristics. A total of 2,626 police officers ranging in rank from constables (n = 1,614; 61%), sergeants (n = 900; 34%) and inspectors and above (n = 112; 4%) responded to the research invitation (response rate of 32%). Approximately two thirds of respondents (n = 1,981; 75%) were male and 633 (24%) were female. The participants mean age was 39 years (age range of 18 to 69 years). The average tenure was 13 years (range of 1 to 43 years).

Measures

Job Demands We employed Wall, Jackson, and Mullarkey's (1995) scales of monitoring and problem-solving demands (9 items; scaling: 1 = *not at all*, 5 = *a great deal*). Acceptable estimates of internal reliability (Cronbach's alpha) for this measure were produced (monitoring demands = .78; problem-solving demands = .86).

Job Resources This construct was measured by levels of job control (10 items, scaling: 1 = *not at all*, 5 = *a great deal*) and social support (8 items, scaling: 1 = *not at all*, 4 = *very much*). Two types of job control were assessed: method control and timing control (Wall et al., 1995). Social support refers to the perceived availability of support from immediate supervisor, and work colleagues for work-related problems (Caplan et al., 1975). Acceptable estimates of internal reliability were produced: timing control = .91; method control = .89; supervisor support = .92; colleague support = .87.

Work Engagement The Utrecht work engagement scale (9 items) (Schaufeli et al., 2006) was included to measure three dimensions of work engagement: absorption, dedication and vigor (scaling: 0 = *never*, 6 =

every day). Cronbach's alpha coefficients were found to be acceptable: absorption = .78; dedication = .87; vigor = .92.

Neuroticism We adopted the 12-item neuroticism scale developed by Eysenck, Eysenck, and Barrett (1985) (scaling: 0 = *almost never*, 4 = *always*). An acceptable estimate of internal reliability was .88.

Results

The descriptive statistics indicated that job resources (job control and social support) were significantly correlated with all three dimensions of engagement in the expected directions. However, we found gender was significantly correlated with absorption. An independent *t* test indicated that female officers demonstrated higher level of work absorption than male officers, t (2605) = 3.49, $p < .001$. Officer's organizational tenure and age were significantly and negatively correlated with dedication and vigor, while tenure was also negatively associated with well-being. Officers' rank was significantly correlated with work engagement (except an association between sergeants and absorption).

To examine if job demands-resources are significant antecedents of the three constructs of work engagement, the research measures were entered into three hierarchical multiple regression analyses. To control for possible confounding effects, demographic variables (age, gender, tenure and rank) were entered at step one. To examine the potential inflation effect of neuroticism on the predictor-criterion relationship, neuroticism was entered at step two. To test the main effect of predictors on criterion variables after controlling for the influence of confounding variables, job demands (monitoring demands and problem-solving demands) were entered at step three and job resources (job control and social support) were entered at step four. To determine the nonlinear relationship between job demand-resources and work engagement, the quadratic terms were entered at step five (the quadratic terms were calculated by squaring the appropriate continues variable; Aiken & West, 1991). Finally, the relevant interaction terms were entered at step six. The interaction terms were created by centering a set of predictors (demands and resources) and computing the interaction term of demands x resources.

Main Effects of Job Demands and Job Resources

After the inclusion of demographic and neuroticism predictors, job demands and job resources accounted for a substantial proportion of additional variance on work engagement (Table 1, due to space restrictions only steps 1 to 4 are shown). Only monitoring demands significantly predicted absorption and dedication. The regression equations explained 6% of the variance in absorption (F (8, 2510) = 20.02, $p < .001$), and 14% of the variance in dedication (F (8, 2509) = 48.93, $p < .001$). All of the job resources (except timing control) demonstrated significant main effects in the prediction of work engagement. The regression equations explained 16% of the variance in absorption (F (12, 2506) = 39.09, $p < .001$), 31% of the variance in dedication (F (12, 2506) = 94.39, $p < .001$) and 30% of the variance in vigor (F (12, 2506) = 91.89, $p < .001$).

Nonlinear Effects of Job Demands and Job Resources

The block of quadratic terms entered at step 5 explained a small but significant amount of variance in absorption ($\Delta R^2 = .01$, $p < .01$), dedication ($\Delta R^2 = .01$, $p < .001$) and vigor ($\Delta R^2 = .01$, $p < .001$). The quadratic term for supervisor support was significantly associated with both dedication and vigor, while timing control was significantly associated with absorption. Both linear and quadratic coefficients for supervisor support indicated that these variables have a predominantly positive relationship with engagement, with a concave downward curve.

Interaction Effects of Job Demands and Job Resources

The interaction effects of job demands and job resources were assessed after controlling for main effects and quadratic terms. None of the interaction terms indicated a significant association with the work engagement. We found therefore, that job resources did not moderate the relationship between job demands and engagement.

Possible Inflation Effect of Neuroticism on Predictor-Criterion Relationship

Neuroticism was a significant predictor in the regression equations and was the largest individual predictor of dedication and vigor. To examine the inflation effect of neuroticism we replicated all regression analyses with neuroticism omitted from the equations. The results of these analyses are not illustrated but are briefly summarised here. We found that job demands accounted for similar amounts of explained variance in the prediction of absorption ($\Delta R^2 = .02$, $p < .001$), dedication ($\Delta R^2 = .01$, $p < .001$) and vigor ($\Delta R^2 = .02$, $p < .001$). Job resources also accounted for similar amounts of explained variance in the prediction of absorption ($\Delta R^2 = .11$, $p < .001$), dedication ($\Delta R^2 = .24$, $p < .001$) and vigor ($\Delta R^2 = .20$, $p < .001$). Additionally, the block of quadratic terms accounted for similar amounts of explained variance in the prediction of absorption ($\Delta R^2 = .01$, $p < .001$), dedication ($\Delta R^2 = .01$, $p < .001$) and vigor ($\Delta R^2 = .01$, $p < .001$) The regression equations explained 17% of the variance in absorption (F (25, 2503) = 19.84, $p < .001$), 27% of the variance in dedication (F (25, 2502) = 37.84, $p < .001$) and 25% of the variance in vigor (F

(25, 2503) = 33.68, $p < .001$). It is therefore apparent that neuroticism did not inflate the relationships between predictors and work engagement.

Discussion

We employed the JD-R model as a theoretical framework to guide the current study. Unlike past research, we simultaneously examined the relationship between demands, resources and engagement. Overall, results support the applicability of the main effect of demands-resources on employee engagement. While most additive hypotheses were (Hypothesis 1 and Hypothesis 3, Hypothesis 2 was not supported), no moderated hypotheses were supported (Hypothesis 4). A substantive interaction between demands and resources was also not observed during the foundation research of the JD-R concept (Demerouti et al., 2001). Schaufeli and Bakker (2004) examined the impact of demands and support (as job resources) on employee engagement. However, these authors did not explicitly test for demands x support interactions. Job resources (timing control, supervisor support and colleague support) proved to be important in the present study. After we controlled for demands, job resources had a significant additive relationship with engagement. There were no significant interactions between resources and the study variables (Hypothesis 4). These non-significant findings can be interpreted in the sense that regardless of perceptions of work demands, perceptions of resources have a consistent and positive association with engagement. This illustrates the importance of providing sufficient work resources to employees.

Traditionally, we conceptualise demands as a stressor having negative influences on outcomes. For example, employees with high work demands will become physically and mentally exhausted with their job and disengage from work (i.e. demands are negatively associated with vigor). However the positive relationship between monitoring demands and engagement (absorption and dedication) produced by the current research makes some sense in terms of ensuring that work is demanding enough to engage workers. Employees with undemanding work levels are likely to be bored and disengaged.

With regards to the hypothesised curvilinear relationship between demands-resources and engagement (Hypothesis 5), the quadratic terms of both supervisor support and timing control were statistically small but significant within some of the regression equations. These findings imply that supervisor support and timing control have nonlinear relationships with some aspects of engagement. Thus, insufficient or excessive resources in term of support and job control can influence disengagement.

In sum, the pattern of findings produced by this research should not necessarily be considered as a lack of support for the JD-R model. The present study does provide an important perspective to the applicability of JD-R model within an applied (police) sample and supports previous work in confirming the importance of sufficient levels of support and control (resources) in order to engage employees (police officers). This research also employed the specific subscales of both job demands and resources in this test of the JD-R, as opposed to using composite scales. The results

Table 1: Summary of hierarchical regression analyses predicting work engagement (N = 2,636)

		Absorption			Dedication			Vigor		
		Step 4			Step 4			Step 4		
Step	Variables	β	R^2	ΔR^2	β	R^2	ΔR^2	β	R^2	ΔR^2
1	Age	.01	.02***	.02***	.03	.02***	.02***	.00	.03***	.03***
	Gender	.08***			.00			.01		
	Organisational tenure	-.12***			-.14***			-.15***		
	Rank 1	.14***			.06**			.09***		
	Rank 2	.12***			.04			.05*		
2	Neuroticism	-.06**	.04***	.02***	-.23***	.13***	.11***	-.27***	.16***	.13***
3	Monitoring demands	.16***	.06***	.02***	.09***	.14***	.01***	.03	.16***	.00
	Problem-solving demands	-.04			-.03			-.03		
4	Timing control	-.01	.16***	.10***	.02	.31***	.27***	.00	.30***	.14***
	Method control	.22***			.25***			.25***		
	Supervisor support	.16***			.17***			.17***		
	Colleague support	.06**			.15***			.12***		

Note: ***$p < .001$, **$p < .01$; *$p < .05$. The coefficients reported are standardised regression weights. Significance of ΔR^2 tested with partial F-tests in regression equations. Gender dummy coded 0 = male, 1 = female. Rank 1 dummy coded 1 = inspector or higher ranks, 0 = other ranks. Rank 2 dummy coded 1 = sergeants, 0 = constables.

identified that not all aspects of demands and resources are significant in the prediction of work engagement. Instead, future work is recommended to focus on the specific demands and resources factors that are most strongly associated with engagement. A focus on these specific relationships is expected to be of value for both theory development purposes and for practical implications for organisations (such as police services).

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References

Bakker, A. B. (2005). Flow among music teachers and their students: The crossover of peak experiences. *Journal of Vocational Behavior, 66*, 26-44.

Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of art. *Journal of Managerial Psychology, 22*, 309-328.

Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2003). Dual processes at work in a call centre: An application of the job demands-resources model. *European Journal of Work and Organizational Psychology, 12*(4), 393-417.

Bakker, A. B., Schaufeli, W. B., Leiter, M. P., & Taris, T. W. (2008). Work engagement: An emerging concept in occupational health psychology. *Work & Stress, 22*(3), 187-200.

Brough, P., O'Driscoll, M. P., Kalliath, T., Poelmans, S., & Cooper, C. L. (in press). *Workplace psychological health: Current research and practice*. Cheltenham, UK: Edward Elgar.

Caplan, R. D., Cobb, S., French, J. R. P., Harrison, H. V., & Pinneau, S. R. (1975). *Job demands and worker health*. Ann Arbor, MI: The Institute for Social Research, University of Michigan.

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology, 86*(3), 499-512.

Eysenck, S. B. G., Eysenck, H. J., & Barrett, P. (1985). A revised version of the psychoticism scale. *Personality and Individual Differences, 6*(1), 21-29.

Hakanen, J. J., Schaufeli, W. B., & Ahola, K. (2008). The Job Demands-Resources model: A three-year cross-lagged study of burnout, depression, commitment, and work engagement. *Work & Stress, 22*(3), 224-241.

Karasek, R. A. (1979). Job demands, job decision latitude, and mental strain: implications for job design. *Administrative Science Quarterly, 24*, 285-308.

Llorens, S., Bakker, A. B., Schaufeli, W., & Salanova, M. (2007). Testing the robustness of the job demands-resources model: Erratum. *International Journal of Stress Management, 14*(2), 224-225.

Mauno, S., Kinnunen, U., & Ruokolainen, M. (2007). Job demands and resources as antecedents of work engagement: A longitudinal study. *Journal of Vocational Behavior, 70*, 149-171.

Salanova, M., Agut, S., & Peiro, J. M. (2005). Linking Organizational Resources and Work Engagement to Employee Performance and Customer Loyalty: The Mediation of Service Climate. *Journal of Applied Psychology, 90*(6), 1217-1227.

Salanova, M., Llorens, S., Cifre, E., Martinez, I., & Schaufeli, W. B. (2003). Perceived collective efficacy, subjective well-being and task performance among electronic work groups: An experimental study. *Small Group Research, 34*, 43-73.

Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources and their relationship with burnout and engagement: A multiple-sample study. *Journal of Organizational Behavior, 25*, 293-515.

Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The Measurement of Work Engagement With a Short Questionnaire: A Cross-National Study. *Educational and Psychological Measurement, 66*(4), 701-716.

Wall, T. D., Jackson, P. R., & Mullarkey, S. (1995). Further evidence on some new measures of job control, cognitive demand and production responsibility. *Journal of Organizational Behavior, 16*(5), 431-455.

Warr, P. B., Cook, J., & Wall, T. (1979). Scales for the measurement of some work attitudes and aspects of psychological well-being. *Journal of Occupational Psychology, 52*(2), 129-148.

Warr, P. B. (1990). Decision latitude, job demands, and employee well-being. Work and Stress, 4, 285-294.

Warr, P. B. (1994). A conceptual framework for the study of work and mental health. *Work and Stress, 8*(2), 84-97.